Name:_____ Date:_____

Get Into Energy Math
Student Quiz 7
Whole Number Operations

1. Jim needs 300 yards of wire for today's job but only has 125 yards left on the truck. How many additional yards of wire does Jim need for today's work?

A. 200 yards
B. 300 yards
C. 175 yards
D. 125 yards

2. Ernesto is installing a temporary electrical service for a house under construction. The temporary pole is 20 feet long and it must be buried 4 feet in the ground. A meter panel that needs to be installed has to be 5 feet off the ground. How far up the pole does Ernesto mark for the meter installation before the pole is placed in the ground?

A. 10 ft up the pole
B. 5 ft up the pole
C. 7 ft up the pole
D. 9 ft up the pole

3. Tom has to determine the correct amount of amps for the electrical system he is installing to a house. The house needs 1,400 watts of power and the system is a 240-volt system feeding the house. The amps are determined by dividing the watts needed for the house by the system voltage. How many amps of power will this house use? (Round up to the nearest whole number.)

A. 5.8 amps
B. 5.0 amps
C. 6.0 amps
D. 0.58 amps

4. The line crew is laying plastic pipe to pull a service into a house. The driveway to the house is 220 feet long and each piece of plastic pipe is 15 feet long. How many pieces of pipe does the crew need to complete the cable pull to the house? (Round up to the nearest whole number.)

A. 15.0 pieces
B. 23.0 pieces
C. 16.0 pieces
D. 15.3 pieces

5. Jack was asked to calculate the amount of current (amps) needed to light ten 60-watt bulbs. These bulbs use a 120-volt system with a power factor of 0.93. To get the current, he has to divide the total watts (600) by the product of the voltage times the power factor, or 600 divided by (120 x 0.93). Thus, the current is calculated by dividing 600 watts by 111.6 volts. How much current did Jack determine was needed to light the 10 bulbs?

A. 4.65 amps
B. 5.38 amps
C. 0.54 amps
D. 0.47 amps

6. Pete is ordering new materials for the warehouse. He has identified that the warehouse is very short on bolts used to attach equipment to utility poles. Each box of bolts contains 12 bolts. Pete has determined he needs 100 boxes of bolts for the warehouse. How many bolts is Pete ordering?

A. 120 bolts
B. 100 bolts
C. 1,200 bolts
D. 1,000 bolts

7. Camila is working on determining the size of a transmission line to provide the energy needs of a town with 10,000 households. If each household uses 1,000 watts on average, what must the transmission line provide on average?

A. 100,000 watts
B. 10,000 watts
C. 1,000,000 watts
D. 10,000,000 watts

8. As part of her duties, Jeanne records the reading on the cumulative engine hours indicator on each of the diesels monthly. She notes that the diesel ran 249.7 hours in March and 367.2 hours in April. How many additional hours did it run in April when compared to March?

A. 107.5 hours
B. 127.5 hours
C. 117.5 hours
D. 118.5 hours

9. Jeanne knows the new diesel fuel tank is holding 342 cubic feet of fuel and, at the current temperature, the fuel weighs 60 pounds per cubic foot. How many pounds of fuel are in the tank?

A. 20,420 lbs
B. 20,520 lbs
C. 19,520 lbs
D. 19,420 lbs

10. Jeanne needs 2,850 feet of #10 AWG wire for a plant upgrade. She locates a pallet containing 10 reels of #10 AWG wire and each reel contains 250 feet. How many feet of #10 AWG wire has she found?

A. 200 ft
B. 2,250 ft
C. 2,500 ft
D. 28,500 ft

11. Harry is resupplying a gas truck with bolts. He has several different sizes to put in the truck bins. Harry has twenty 3/8 x 5 inch bolts, thirty-two 1 x 5 inch bolts, eighteen 3/4 x 5 inch bolts, and twenty-four 3/8 x 6 inch bolts. How many bolts is Harry loading into the truck bins?

A. 94 bolts
B. 70 bolts
C. 76 bolts
D. 74 bolts

12. Mary and the gas crew are performing valve maintenance at a gate station. The valve body bolts are 1-inch bolts that need to be torqued to 1,392 ft-lbs. The crew has torqued the bolts to 1,199 ft-lbs. How many more ft-lbs does the crew have to torque the bolts to reach the torqueing requirements?

A. 193 ft-lbs
B. 93 ft-lbs
C. 190 ft-lbs
D. 1,392 ft-lbs

13. Joe and the gas crew are replacing old cast iron piping with plastic piping. They must replace 7 lengths of 16-foot cast iron pipe. How many feet of plastic pipe does the crew need to complete the job?

A. 112 ft
B. 56 ft
C. 72 ft
D. 23 ft

14. Ned's crew is calculating the design pressure of a 12-inch steel pipe. The calculation for the Design Pressure = (2 x Operating Pressure x Wall Thickness) / Outside Pipe Diameter. Ned's crew has the following numbers: 35,000 psi operating pressure, 0.281-inch wall thickness, and 12.75-inch outside diameter. After multiplying the first three numbers together, this calculation reduces to: 19,670 / 12.75 = design pressure. What number would Ned's crew report as the design pressure?

A. 1,543 psig
B. 15,427 psig
C. 154.3 psig
D. 15.427 psig

15. Pete is monitoring gas customers who don't have gas (called an outage) related to a valve failure in the system. The current number of outages is 428 customers. In order for the valve to be repaired, the gas system has to be shut down for a couple of hours. The resulting shutdown is going to increase the number of outages to 100 times more customers. How many customer outages is Pete expected to report?

A. 42 outages
B. 428 outages
C. 4,280 outages
D. 42,800 outages

16. Tom and the gas crew are monitoring corrosion on steel gas pipelines. A month ago, the metal loss calculated for the pipe was 0.043 pounds. The crew has noticed an increase in the corrosion rate based on an increase in stray voltage on the system. The new rate is 10 times faster than measured a month ago. What new metal loss would the crew report?

A. 0.0430 lbs
B. 0.0043 lbs
C. 43 lbs
D. 0.43 lbs

17. Demetra and Henry, two power plant electricians, are inspecting electrolyte fluid levels in battery cells. They noted several low levels in the battery cell banks and are using fluid to refill them. They use 5 pints to fill one bank of cells, 8.5 pints in the next bank of cells, and 4.5 pints in the last bank of cells. If they had 50 pints of electrolyte fluid to start with, how much electrolyte fluid do they have left?

A. 18 pints
B. 21 pints
C. 32 pints
D. 37 pints

18. Mia is planning for an upcoming job and knows that two electricians working together can inspect, clean, and test a Motor Control Unit (MCU) in two hours. How many MCUs could the two electricians inspect over the course of a 40-hour workweek?

A. 10 MCUs
B. 20 MCUs
C. 40 MCUs
D. 80 MCUs

19. Brian, an electronics technician, has been asked to check out a voltage amplifier that is supposed to have a gain of 10,000. He measures the amplifier input and records a reading of 100 microvolts (0.000100 volt). If the amplifier is operating properly, what voltage would Brian expect to find at its output?

A. 1 volt
B. 10 volts
C. 0.1 volt
D. 0.01 volt

20. As part of her duties, Kari is asked to check the oxygen content of a confined space the line crew has to enter. Kari checks the air content and the meter alarms for low oxygen content at 18.7%. The normal content of oxygen in air is 21%. How many percent must the oxygen content change so the percentage comes up to 21% and the crew can enter the confined space?

A. 4.4%
B. 2.3%
C. 3%
D. 2.4%

21. Mary is working in a residential subdivision. The voltage in the subdivision is 13,600 volts. This voltage must be equally divided among the 5 subdivision branches. What would be the voltage for each branch?

A. 3,000 volts
B. 2,720 volts
C. 2,700 volts
D. 1,360 volts

22. Camila has to calculate how many amps of current are required for a 10,000 kW load from a 220-volt AC system with a power factor of 0.8. To begin, Camila must multiply 220 volts by the power factor of 0.8. What would this number be?

A. 17.6
B. 176
C. 1,760
D. 17,600

23. Camila is calculating the energy use of a large industrial customer over a 5.5-hour period. The customer uses 10,000 kW/hour, so how many kW of energy did the customer use in a 5.5-hour time period?

A. 55,000,000 kW
B. 55,000 kW
C. 550.0 kW
D. 55.0 kW

24. Tim, a power system control technician, received an alarm of an under-voltage condition on the electrical system. The normal voltage on the system is 13.6 kV. Tim's reading indicates voltage dropped by 1/1,000. What would be the system voltage?

A. 0.0136 kV
B. 0.136 kV
C. 0.00136 kV
D. 1.36 kV

25. Jack is asked to log the energy in megawatt-hours on one of the larger generators in the plant. Its energy instrument currently reads 3,141,592.2 kW-h. Since 1 megawatt-hour is equivalent to 1,000 kilowatt-hours, how many MW-h should he report?

A. 3,141.4 MW-h
B. 3,141 MW-h
C. 3,141.5 MW-h
D. 3,141.6 MW-h